

Quasi-Resonant DC-DC Converters with Reduced Body Diode Loss

ABSTRACT OF THE DISCLOSURE

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Buck converters having a resonant inductor L_r , resonant capacitor C_r , and synchronous switch Q_3 that together provide reduced switching loss and soft switching. In operation, the resonant inductor L_r is charged during a time period A . Then, L_r is freewheeling and provides current to an output inductor L_o . Then, Q_3 is turned OFF, and
10 energy from the resonant inductor L_r charges the resonant capacitor C_r . Finally, energy from the resonant capacitor C_r is provided to the output inductor and load. The output power can be adjusted by phase control of the operation of switch Q_3 . In alternative embodiments, the circuit has a pair of coupled inductors L_1 L_2 or an isolation transformer 40. The coupled inductors have a polarity selected so that the output voltage is reduced, thereby allowing top
15 switch Q_1 to have a greater duty cycle. These circuits feature no body diode loss in the switch Q_3 .